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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,760	01/09/2004	GERALD SCHULTZ	65271-028 (135556)	1759
36682 7590 02/05/2008 DYKEMA GOSSETT PLLC 2723 SOUTH STATE STREET SUITE 400 ANN ARBOR, MI 48104			EXAMINER CHU, HELEN OK	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 02/05/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/707,760		SCHULTZ, GERALD	
	<b>Examiner</b>		<b>Art Unit</b>	
	Helen O. Chu		1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/9/2004, 6/30/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 1/9/2004, 6/30/2005 was filed. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Drawings***

2. The drawings were received on 1/9/2004.

### ***Claim Objections***

3. Claims 3 and 23 are objected to because of the following informalities: The recitation "in at least one of absorption; fluorescence" should be corrected to "in at least one of absorption, fluorescence". Appropriate corrections are required.
4. Claim 13 is objected to because of the following informalities: The recitation "functionalized perylenes and binaphthyls; and dihydroxy-bipyridyles" should be corrected to " functionalized perylenes, binaphthyls and dihydroxy-bipyridyles ". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
6. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation "functionalized perylenes" is unclear to the

Examiner. What constitutes a compound to be functionalized or not functionalized? The specification does not further disclose the “functionalized” and therefore appropriate corrections are required.

### ***Claims Analysis***

7. “Functionalized perylenes” will be interpreted by the Examiner as “perylenes”

### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-7, 10, 11, 14-16, 18, 19, 21-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Hakenjos et al. (A PEM fuel cell for combined measurement of current and temperature distribution, and flow field flooding).

In regards to claims 1-7, 14-16, 18, 19, the Hakenjos et al. reference discloses an apparatus for experiments to perform a simultaneous evaluation of current, temperature and water distribution in a polymer electrolyte fuel cell under operation. The test cell includes an anode side (Page 214, Section 2.2), an optical window as the back plate of the cathode flow field for optically connecting input and output locations (Figure 5) and is transparent for infrared (IR) as well as for visible wavelengths (Abstract). The

input location and the output location exist on the optical window in which the window absorbs IR light and outputs to the infrared camera.

In regards to claim 10 The Hakenjo et al. reference observing the temperature distribution, the flooded area appears to be warmer even than the more active areas of the cell (Section 2.2, third paragraph)

In regards to claim 11, the IR camera (Applicant's processor) is sensitive to wavelengths and output a graph (Figure 3 and 4)

In regard to claims 21-23, The Hakenjos et al. reference discloses an optical window formed on the cathode as a back plate and a method of digital infrared thermography to record the temperature distribution on the active area. (Section 1, Paragraph 3) in which the optical window absorbs IR light while the fuel cell is operating. The IR camera records the data of the optical window and translates the information on a graph (Section 2.3, Figure 3 and 4).

In regards to claim 24, the Hakenjos et al. reference discloses electrically conductive coating on opposite surfaces of the PEM, that is, stainless steel current collector on the anode side and a graphite layer on the cathode side.

10. Claims 1-7, 10-12, 14-16, 18, 19, 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Lamont et al. (U.S. Patent 5,763,765)

In regards to claims 1-7, 10, 11, 14-16, 18, 19, 21-23 the Lamont et al. reference discloses a method and apparatus detects and locates perforations in a membrane. The test cell includes an anode, a cathode and an optical window (Figure 1, Component 12) to test perforations or leak in the membrane of a fuel cell causing the fuel and oxidant

streams to fluidly communicate and chemically react (Column 1-2, Lines 65-5). The Lamont et al. reference discloses that the anode and cathode reactions exothermically yield water (Column 1, Lines 50-55) and heat (Abstract). Infrared thermal detector detects the heat generated and process an image (Applicants output location) to a monitor (Component 46). The input location and the output location exist on the optical window in which the window absorbs IR light and outputs to the infrared camera.

In regard to claim 12, the Lamont et al. reference discloses ion-exchange membrane to be a perfluorosulfonic membrane (Column 1, Lines 55-60)

In regards to claim 24, the Lamont et al. reference discloses electrically conductive sheets on opposite surfaces of the PEM (Column 1, Lines 20-25)

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hakenjos et al. (A PEM fuel cell for combined measurement of current and temperature distribution, and flow field flooding).

The Hakenjos et al. reference discloses the claimed invention above and further incorporated herein. The Hakenjos et al. reference does not disclose a perfluorinated

polymer in the membrane, however, it is well known to one of ordinary skill in the art to include a perfluorinated polymer such as Nafion as an electrolyte in a PEM fuel cell.

13. Claims 3, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamont et al. (U.S. Patent 5,763,765) as evidence by Klienerman (U.S. Patent 5,560,712).

The Lamont et al. reference discloses the claimed invention above and further incorporated herein. The Lamont et al. reference does not disclose a fluorophore operative to produce fluorescence in response to the input radiation and the water hydration present quenches the fluorescence in accordance to the concentration, however, the Kleinerman reference discloses that it is known to one of ordinary skill in the art for measuring temperature include the use of probes made of materials having temperature-dependent photo-luminescence properties. One of the earlier systems uses a photo luminescent material the luminescence intensity of which quenched appreciably with an increase of temperature. Luminescence quenching is usually associated with a decrease of the luminescence decay time of the material following the excitation of its luminescence pulsed or oscillatory light of wavelengths within an electronic absorption band characteristic of the material (Column 1, Lines 32-45).

14. Claim 13, 17 and 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lamont et al. (U.S. Patent 5,763,765) in view of Klienerman (U.S. Patent 5,560,712).

The Lamont et al. reference discloses the claimed invention above and further incorporated herein. The Lamont et al. reference does not disclose utilizing a



fluorescent dye selected from the group comprising functionalized perylenes and binaphthyls and dihydroxy bipyridyles and wherein the input and the output windows are optically aligned on opposite sides of the PEM, however, the Kleinerman reference discloses a new technique which the input and the output windows are optically aligned on opposite sides of the PEM and uses fluorescent dyes such as bis-benzanthrone (Column 5, lines 1-10) which is a ketone perylene where temperature dependence of the index of refraction of the component of light guide can be used for measuring minute temperature changes, suitable for measuring smaller changes (Column 2, Lines 40-60) in temperature while. A further example is 2.1 An infrared Image Converter where fluorescent dyes are used to absorb the reflected light intensity of the light of the wavelength, the thermal infrared image is thus converted into a fluorescence light image which can be converted into a TV display (Column 9, Lines 11-20). Therefore, it would have been obvious to one of ordinary skill to incorporate the florescent dyes with reflected infrared light when monitoring thermal differences as disclosed by Kleinerman into the Infrared thermal monitoring of the apparatus as disclosed by Lamont et al. in order to measure temperature differences within the apparatus to a specific value resulting in more accurate evaluations.

15. Claims 3 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamont et al. (U.S. Patent 5,763,765) in view of Yamashita et al. (JP Publication 2001-124695) The Lamont et al. reference discloses the claimed invention above and further incorporated herein. The Lamont et al. reference does not specifically discloses a reflector opposing the aperture for reflecting input light towards the aperture, however,




the Yamashita et al. reference illustrates an infrared reflector opposing the aperture in which the input IR light emits through (Figure 5). The Yamashita et al. reference adds that such orientation will raise the accuracy of the IR measurement by making the optical path crooked (Paragraph 55) with reflectors. Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the reflecting plate on the opposing side of the window in which IR light enters as disclosed by Yamashita et al. into the PEM fuel cell which also uses IR light as disclosed by Lamont et al. in order to obtain more accurate measurements for testing which results in advance products.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Helen O. Chu whose telephone number is (571) 272-5162. The examiner can normally be reached on Monday-Friday 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
RAYMOND ALEJANDRO  
PRIMARY EXAMINER